IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

REQUEST FOR FILING NATIONAL PHASE OF PCT APPLICATION UNDER 35 U.S.C. 371 AND 37 CFR 1.494 OR 1.495

To: Hon. Commissioner of Patents
Washington, D.C. 20231

00909

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

Atty Dkt: PM 276563 /T298059US/pak/kp
M# /Client Ref.

From: Pillsbury Winthrop LLP, IP Group:

Date: February 15, 2001

This is a **REQUEST** for **FILING** a PCT/USA National Phase Application based on:

1. International Application	2. International Filing Date	3. Earliest Priority Date Claimed
PCT/FI99/00720	6 September 1999	9 September 1998
⇧ country code	Day MONTH Year	Day MONTH Year
		(use item 2 if no earlier priority)

4. Measured from the earliest priority date in item 3, this PCT/USA National Phase Application Request is being filed within:

(a) ☐ 20 months from above item 3 date (b) ☒ 30 months from above item 3 date,

(c) Therefore, the due date (unextendable) is March 9, 2001

5. Title of Invention TRANSMISSION METHOD AND RADIO SYSTEM

6. Inventor(s) KOLMONEN, Juha

Applicant herewith submits the following under 35 U.S.C. 371 to effect filing:

7. ☒ Please immediately start national examination procedures (35 U.S.C. 371 (f)).

8. ☐ **A copy of the International Application** as filed (35 U.S.C. 371(c)(2)) is transmitted herewith (file if in English but, if in foreign language, file only if not transmitted to PTO by the International Bureau) including:

a. ☐ Request;
b. ☐ Abstract;
c. _____ pgs. Spec. and Claims;
d. _____ sheet(s) Drawing which are ☐ informal ☐ formal of size ☐ A4 ☐ 11"

9. ☒ **A copy of the International Application has been transmitted by the International Bureau.**

10. **A translation of the International Application** into English (35 U.S.C. 371(c)(2))
a. ☒ is transmitted herewith including: (1) ☒ Request; (2) ☒ Abstract;
(3) 12 pgs. Spec. and Claims;
(4) 2 sheet(s) Drawing which are:
☐ informal ☒ formal of size ☒ A4 ☐ 11"
b. ☐ is not required, as the application was filed in English.
c. ☐ is not herewith, but will be filed when required by the forthcoming PTO Missing Requirements Notice per Rule 494(c) if box 4(a) is X'd or Rule 495(c) if box 4(b) is X'd.
d. ☐ Translation verification attached (not required now).

RE: USA National Filing of PCT /FI99/00720

11. ☒ **PLEASE AMEND** the specification before its first line by inserting as a separate paragraph:
a. ☒ --This application is the national phase of international application PCT/FI99/00720 filed September 6, 1999 which designated the U.S.--
b. ☐ --This application also claims the benefit of U.S. Provisional Application No. 60/ _____, filed _____ .--

12. ☐ Amendments to the claims of the International Application **under PCT Article 19 (35 U.S.C. 371(c)(3)), i.e., before 18th month from first priority date above in item 3, are transmitted herewith (file only if in English) including:**

13. ☒ PCT Article 19 claim amendments (if any) have been transmitted by the International Bureau

14. ☐ Translation of the amendments to the claims **under PCT Article 19 (35 U.S.C. 371(c)(3)), i.e., of claim amendments** made before 18th month, **is attached (required by 20th month from the date in item 3 if box 4(a) above is X'd, or 30th month if box 4(b) is X'd, or else amendments will be considered canceled).**

15. **A declaration of the inventor** (35 U.S.C. 371(c)(4))
a. ☒ is submitted herewith ☒ Original ☐ Facsimile/Copy
b. ☐ is not herewith, but will be filed when required by the forthcoming PTO Missing Requirements Notice per Rule 494(c) if box 4(a) is X'd or Rule 495(c) if box 4(b) is X'd.

16. **An International Search Report (ISR):**
a. Was prepared by ☐ European Patent Office ☐ Japanese Patent Office ☒ Other
b. ☒ has been transmitted by the international Bureau to PTO.
c. ☒ copy herewith (2 pg(s).) ☒ plus Annex of family members (1 pg(s).).

17. **International Preliminary Examination Report** (IPER):
a. ☒ has been transmitted (if this letter is filed after 28 months from date in item 3) in English by the International Bureau with Annexes (if any) in original language.
b. ☒ copy herewith in English.
c.1 ☐ IPER Annex(es) in original language ("Annexes" are amendments made to claims/spec/drawings during Examination) including attached amended:
c.2 ☐ Specification/claim pages #_____ claims # Dwg Sheets #
d. ☐ Translation of Annex(es) to IPER **(required by 30th month due date, or else annexed amendments will be considered canceled).**

18. **Information Disclosure Statement** including:
a. ☒ Attached Form PTO-1449 listing documents
b. ☒ Attached copies of documents listed on Form PTO-1449
c. ☒ A concise explanation of relevance of ISR references is given in the ISR.

19. ☒ **Assignment** document and Cover Sheet for recording are attached. Please mail the recorded assignment document back to the person whose signature, name and address appear at the end of this letter.

20. ☐ Copy of Power to IA agent.

21. ☐ **Drawings** (complete only if 8d or 10a(4) not completed): ___ sheet(s) per set: ☐ 1 set informal; ☐ Formal of size ☐ A4 ☐ 11"

22. Small Entity Status ⌀ ☒ is **Not** claimed ☐ is claimed (**pre**-filing confirmation required)
22(a) _____ (No.) Small Entity Statement(s) enclosed (since 9/8/00 Small Entity Statements(s) not essential to make claim)

23. **Priority** is hereby claimed under 35 U.S.C. 119/365 based on the priority claim and the certified copy, both filed in the International Application during the international stage based on the filing in (country) FINLAND of:

	Application No.	Filing Date		Application No.	Filing Date
(1)	981935	Sept. 9, 1998	(2)		
(3)			(4)		
(5)			(6)		

a. ☒ See Form PCT/IB/304 sent to US/DO with copy of priority documents. If copy has not been received, please proceed promptly to obtain same from the IB.
b. ☐ Copy of Form PCT/IB/304 attached.

RE: USA National Filing of PCT/FI99/00720

528 Rec'd PCT/PTO 15 FEB 2001

24. Attached: Copy of Finnish OA

25. **Preliminary Amendment:**

25.5 Per Item 17.c2, **cancel original** pages #_____, claims #_____, Drawing Sheets #

26. **Calculation of the U.S. National Fee (35 U.S.C. 371 (c)(1)) and other fees is as follows:**
Based on amended claim(s) per above item(s) ☐ 12, ☐ 14, ☐ 17, ☐ 25, ☐ 25.5 (hilite)

Total Effective Claims	23	minus 20 =	3	x $18/$9	=	$54	966/967
Independent Claims	2	minus 3 =	0	x $80/$40	=	$0	964/965
If any proper (ignore improper) Multiple Dependent claim is present,				add$270/$135		+0	968/969

BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(4)): →→ **BASIC FEE REQUIRED, NOW** →→→→

A. If country code letters in item 1 are **not** "US","BR","BB","TT","MX","IL" "NZ", "IN" or "ZA"

See item 16 re:

1.	Search Report was not prepared by EPO or JPO	add$1000/$500		960/961
2.	Search Report was prepared by EPO or JPO	add$860/$430	+1000	970/971

SKIP B, C, D AND E UNLESS country code letters in item 1 are "US","BR","BB","TT","MX","IL", "NZ", "IN" or "ZA"

(X) →	☐	B.	If USPTO did not issue both International Search Report (ISR) and (if box 4(b) above is X'd) the International Examination Report (IPER),	add$970/$485	+0 960/961
(only) (one) → (of)	☐	C.	If USPTO issued ISR but not IPER (or box 4(a) above is X'd),	add$710/$355	+0 958/959
(these) (4) → (boxes)	☐	D.	If USPTO issued IPER but IPER Sec. V boxes not all 3 YES,	add$690/$345	+0 956/957
→	☐	E.	If international preliminary examination fee was paid to USPTO and Rules 492(a)(4) and 496(b) satisfied (IPER Sec. V all 3 boxes YES for all claims),	add $100/$50	+0 962/963

27. **SUBTOTAL =** $1054

28. If Assignment box 19 above is X'd, add Assignment Recording fee of ----$40 +40 (581)

29. Attached is a check to cover the - **TOTAL FEES** $1094

Our Deposit Account No. 03-3975
Our Order No. 60258 (C#) | 276563 (M#)

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CHARGE STATEMENT: The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 and 492 (missing or insufficient fee only) now or hereafter relative to this application and the resulting Official document under Rule 20, or credit any overpayment, to our Account/Order Nos. shown above for which purpose a duplicate copy of this sheet is attached.
This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal form is filed

Pillsbury Winthrop LLP
Intellectual Property Group

By Atty: Richard C. Irving **Reg. No.** 38499

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NOTE: File in duplicate with 2 postcard receipts (PAT-103) & attachments.

TRANSMISSION METHOD AND RADIO SYSTEM

FIELD OF THE INVENTION

The invention relates to a transmission method used in a radio system comprising a base transceiver station acting as a transceiver and subscriber terminals acting as transceivers which are connected to each other by means of a signal propagating through the base transceiver station, which signal contains speech or data which is coded before it is transmitted to the radio path and decoded when it is received from the radio path, and in which method the signal establishing the connection is transmitted in a radio channel formed for each connection.

BACKGROUND OF THE INVENTION

In a cellular radio system, discontinuous transmission, or DTX, is used to reduce interference and the power consumption of a subscriber terminal. The cellular radio system can be a GSM system, for instance. When a speech coder of a transceiver notices a break in speech, the transceiver only transmits a silence descriptor frame, i.e. SID frame. A SID frame is typically transmitted once every 480 ms.

A SID frame is typically used to generate noise in a subscriber terminal in DTX mode. If a noise of suitable volume was not generated, the receiver would find the silence caused by breaks uncomfortable. In the worst case, the receiver would think that the connection has been broken. During breaks in speech, the coder enters DTX mode during which SID frames are transmitted. The SID frames transmitted during breaks in speech comprise various update data. The receiver uses the update data when generating noise, for instance. In addition, L2 filler frames, for instance, are transmitted during DTX. Filler frames are transmitted when there is nothing else to transmit.

A transceiver of a radio system can in some cases very quickly need information on the changes taking place in the radio channel. This means that the subscriber terminal must receive updated information on the status of the data and radio channel at a fast pace. A receiver of the kind mentioned above is for instance an AMR transceiver (AMR = Adaptive Multirate) which requires a fast adaptation rate. In addition, radio systems need to transmit control commands, for instance, as often as possible to a coder and decoder concerning the AMR mode, for instance. However, during

DTX, it is not possible to increase the channel update rate, i.e. the number of transmitted frames, enough without reducing too much the benefit derived from DTX.

BRIEF DESCRIPTION OF THE INVENTION

It is thus an object of the invention to implement a transmission method and a radio system so as to solve the above-mentioned problems. This is achieved by the type of transmission method disclosed in the preamble, characterized by measuring the radio channel and transmitting a control signal on the basis of the obtained measurement results from a transceiver in DTX mode to a transceiver with which the transceiver in DTX mode has formed the radio channel, and transmitting the control signal at a power level which is lower than the power level used in transmitting speech or data signals, and updating with the received control signals the operating parameters of the transceiver forming the radio channel to the transceiver in DTX mode.

A further object of the invention is a radio system comprising a base transceiver station acting as a transceiver and at least two subscriber terminals acting as transceivers which are connected to each other by means of a signal propagating through the base transceiver station, which signal contains speech or data; a transceiver in the radio system comprises a coder, which codes the signal to be transmitted to the radio path, and a decoder, which decodes the signal received by the transceiver, which has propagated in the radio path in the radio channel formed for the connection between the subscriber terminal and the base transceiver station.

The radio system of the invention is characterized in that it comprises measuring means which measure the status of the radio channel formed between the base transceiver station and the subscriber terminal, transmission means which transmit a control signal on the basis of the measurement results of the measuring means from the transceiver in DTX mode to the transceiver with which the transceiver in DTX mode has formed a radio channel, and which transmission means transmit the control signal at a power level which is lower than the power level used for transmitting speech or data signals, and control means which update operating parameters with the received control signals from the transceiver which is connected to the transceiver in DTX mode by means of the radio channel.

The preferred embodiments of the invention are set forth in the dependent claims.

The invention is based on the idea that the transceiver in DTX mode transmits a control signal using a lower transmission power level than used in transmitting a normal signal containing speech or data.

The transmission method and radio system of the invention provides several advantages. The transceiver in DTX mode transmits at a relatively low transmission power level control signals which alter the operating parameters of the transceiver receiving the control signals, whereby the adaptation of the transceiver receiving the control signals to the speech or data signals can be accelerated. In addition, it is possible to transmit, at a lower transmission power level than that used in transmitting normal speech and data signals, to the transceiver in DTX mode a control signal, with which the coding and decoding rates of the signal are altered. This way, the coding rates used by the base transceiver station and the subscriber terminal in speech and data coding and decoding remain optimal all the time. The method of the invention is particularly well suited for radio systems based on a very fast transmission frequency whereby a high transmission capacity can be achieved.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following, the invention will be described in greater detail in connection with preferred embodiments and with reference to the attached drawings in which

Figure 1 shows a radio system which uses the method of the invention,

Figure 2 shows the structure of a transceiver used in a radio system of the invention in principle,

Figure 3 shows a signal transmitted by a transceiver in a radio system of the invention,

Figure 4 shows a signal transmitted by a transceiver in a radio system of the invention.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1 shows a cellular radio system which uses the method of the invention. The presented cellular radio system comprises a base station controller 300, base transceiver stations 200 and a set of subscriber terminals

100, 101. The base transceiver stations 200 and subscriber terminals act as transceivers in the cellular radio system. The subscriber terminals establish a connection to each other by means of signals propagated through the base transceiver station 200. A subscriber terminal 100 can be a mobile phone, for instance. The radio system presented in Figure 1 can be a GSM or CDMA system, for instance.

Figure 2 shows the structure of a transceiver used in a radio system of the invention in principle. The transceiver presented in Figure 2 can either be a subscriber terminal 100 or a base transceiver station 200. The transceiver comprises an antenna 150 which in practice functions as a transceiver antenna. Additionally, the transceiver comprises radio frequency parts 112, 124, a modulator 123, a demodulator 113 and a control block 120. The radio frequency parts 112 function in practice as signal reception means. The radio frequency parts 124 function in practice as signal transmission means.

Further, the transceiver comprises a coder 122 and a decoder 114. The radio frequency parts 112 transmit the radio frequency signal coming from the antenna to an intermediate frequency. The intermediate frequency signal is forwarded to the demodulator 113 which demodulates the signal. After this, the demodulated signal is decoded in the decoder 114. The decoder for instance decrypts and channel-decodes the signal. The task of the control block 120 of the transceiver is to control the functions of the above-mentioned transceiver blocks.

Coder 122 receives the signal and transmits the signal it has coded to the modulator 123. The coder 122 uses convolution coding, for instance, in the coding. In addition, the coder 122 for instance encrypts and channel-codes the signal. Further, the coder 122 interleaves the bits or bit groups in the signal. After this, the convolution-coded signal is forwarded to the modulator 123 which modulates the signal. After this, the signal is forwarded to the transmission means 124 which convert the modulated signal into radio frequency format. The transmission means transmit the modulated signal by means of the antenna to the radio path.

Let us assume that, for optimum operation, the coder 122 and decoder 114 residing in the transceiver of the radio system very quickly need information on the changes occurring in the radio channel. In the above situation, the information on the status of the radio channel must be updated

at a fast pace. The transceiver comprises measuring means 115 measuring the radio channel, and the measurement data obtained from them is forwarded on to the coder and decoder. For instance, an AMR transceiver (AMR = Adaptive Multirate) comprises a coder 122 and decoder 114 which require a fast adaptation rate. In practice, a fast adaptation rate means that the coder 122 and decoder 114 occasionally very quickly need information on the changes occurred in the radio channel. If the radio channel weakens quickly, information on the weakening must be transmitted as quickly as possible from the transceiver receiving the signal to the transceiver transmitting the signal.

The transceiver in DTX mode measures the radio channel from the filler frames it has received. On the basis of the frames measured by the measuring means 115, the transmission means 124 transmit a control signal which contains information on the status of the radio channel in the down link direction. The radio channel status information can for instance be based on the level, power, signal-to-noise ratio or bit error ratio of the received signal. The operating parameters of the transceiver in DTX mode are updated by means of the status information. Updating the operating parameters affects the operation of the transceiver. The control signal can contain information on handover, for instance, which means that receiving the control signal can alter the operation of the transceiver in a handover situation. The subscriber terminal 100, 101 can transmit control signals to the base transceiver station 200. In addition, the base transceiver station can transmit control signals to the subscriber terminal.

If the operating parameters are coding parameters, the transceiver can receive from the transceiver in DTX mode a control signal by means of which the transceiver can update the coding parameters of its coder and decoder. In practice, the coder and decoder alter their adaptation rate on the basis of the control signals. The coder 122 and decoder 114 can alter their coding rate so that when the coding rate of the speech coder increases, the coding rate of the channel coder decreases. In practice, the coder 122 and decoder 114 have a set of predefined standard coding rates which are, when necessary, altered according to the control data in the received control signals.

The control means 120 can update the coding parameters of the coder 122 acting as a speech coder, which alters the coding rate of speech. The decoding rate used by the decoder 114 can be updated in the same way. Further, the coding parameters of the coder acting as a channel coder can be

updated, which alters the channel coding rate of the channel coder. The decoding rate of the channel decoder can also be altered by means of control signals received by the transceiver.

The coding rates of a coder 122 and a decoder 114 acting as a speech coder can typically vary from 4.5 to 13 kbit/s. The coding rate of a coder acting as a channel coder can typically vary from 9 to 17.5 kbit/s, when the channel coder operates at full speed. The speed of a signal coded by a channel coder is between 0 to 6.5 kbit/s, when the channel coder operates at half speed. On the basis of the measurement result obtained from measuring the radio channel, it is possible to transmit a control signal which alters the coding parameters of the speech coder and channel coder.

Before receiving a control signal, the speech coder can have coded at a rate of 4.5 kbit/s, for instance, and the channel coder can have coded at a rate of 17.5 kbit/s, for instance. After the update of the coding parameters, the speech coder can code at a rate of 13 kbit/s, for instance, and the channel coder at a rate of 9 kbit/s, for instance. Due to updates during DTX, a coder and decoder can adapt faster to the signal being coded or decoded, because the coder and decoder can be set in a predefined optimum operation mode. An increase in the speech coding rate decreases the channel coding rate, and an increase in the channel coding rate decreases the speech coding rate.

Figure 3 shows a signal, which is in an SACCH frame structure, transmitted by a transceiver in a radio system. Figure 3 shows that the transceiver, for instance a base transceiver station, transmits to another transceiver, for instance a mobile phone, speech frames 10 in an SACCH frame. In addition, the transceiver occasionally transmits SID frames and L2 filler frames 30 to the radio path. Information required for measuring the radio channel is transmitted in the SID frames and L2 filler frames 30. During DTX, the transmission means 124 of the transceiver of the invention transmit the SID frames and L2 filler frames at the same power level as the speech frames 10. If the SID frames and L2 frames were transmitted at a lower power level, problems would arise in measuring the radio channel, because a signal with a lower power is more sensitive to various interfering signals.

During DTX, the transmission means 124, which are radio frequency parts in practice, transmit update frames at a lower transmission power level than speech frames. Figure 3 shows that the transmission means 124 transmit update frames in a continuous manner when normal speech

frames 10 or filler frames 30 are not transmitted. In other words, in a situation according to Figure 3, update frames 20 are uninterruptedly transmitted when speech frames or frames used for measuring the channel are not transmitted.

Because the transmission power of the transceiver is, at least to some extent, on all the time, the radio channel can be uninterruptedly estimated. The transmission power of the update frames 20 can for instance be half of that of a speech frame or of frames used for measuring. Even though the update frames are during DTX transmitted at a lower transmission power than speech frames during normal transmission, the average transmission power during DTX increases slightly.

Figure 4 also shows a signal, which is in an SACCH frame structure, transmitted by a transceiver in a radio system. In this case, too, the transmission means 124 of the transceiver transmit the SID frames and L2 filler frames with the same power as the speech frames during DTX. However, Figure 4 shows clearly that the transmission means 124 do not transmit update frames in a continuous manner when normal speech frames 10 or filler frames 30 are not transmitted, but the transmission of the update frames 20 is periodic. In this case, too, the transmission power of the update frames can for instance be only half of the transmission power of a speech frame or of frames used for measuring.

In the situation shown in Figure 4, the update frames 30 are transmitted three separate times between two SID frames. The transmission frequency of the update frames can, however, be lower or higher than described above. The update frames are transmitted during DTX at a lower transmission power than normal speech frames. Even periodic transmission of update frames increases the average transmission power during DTX somewhat as compared with a situation where no update frames are transmitted during DTX.

Because the transceiver is on during DTX, control commands related to the AMR mode, for instance, can be transmitted to the coder and decoder. The control commands can be transmitted in the same way as the update frames. This means that the control commands can be transmitted periodically or as a continuous transmission during DTX. Since information on the status of the radio channel is received during DTX, the power consumption of the subscriber terminal, for instance, can be reduced.

If, during DTX, update data and control commands are transmitted with a considerably lower transmission power, the coder 122 must use efficient channel coding to avoid possible problems arising from the use of the lower transmission power. Turbo coding, for instance, can be used in channel coding to compensate for the increase in errors. By using efficient channel coding, the errors detected in a signal can be corrected in the decoder 114, for instance. Instead of turbo coding, for instance convolution coding can be used, in which the coding depth is greater than in a normal situation.

Even though the invention has been explained in the above with reference to examples in accordance with the accompanying drawings, it is obvious that the invention is not restricted to them but can be modified in many ways within the scope of the inventive idea disclosed in the attached claims.

CLAIMS

1. A transmission method used in a radio system comprising a base transceiver station (200) acting as a transceiver and subscriber terminals (100, 101) acting as transceivers which are connected to each other by means of a signal propagating through the base transceiver station (200), which signal contains speech or data which is coded before it is transmitted to the radio path and decoded when it is received from the radio path, and in which radio system the signal establishing the connection is transmitted in a radio channel formed for each connection, **characterized** by

measuring the radio channel and transmitting a control signal on the basis of the measurement results from a transceiver in DTX mode to a transceiver with which the transceiver in DTX mode has formed the radio channel, and transmitting the control signal at a power level which is lower than the power level used in transmitting speech or data signals, and

updating with the received control signals the operating parameters of the transceiver forming the radio channel to the transceiver in DTX mode.

2. A method as claimed in claim 1, **characterized** in that the operating parameters are coding and decoding parameters which affect the coding and decoding rate of the transceiver.

3. A method as claimed in claim 1, **characterized** in that the speech coding and decoding rates are altered with the operating parameters.

4. A method as claimed in claim 1, **characterized** in that the channel coding and decoding rates are altered by updating the operating parameters.

5. A method as claimed in claim 1, **characterized** in that with the control signals, the control data of the coding of the signal to be transmitted to the radio path and the control data of the decoding of the signal received from the radio path are updated, whereby the adaptation rate of coding and decoding can be altered.

6. A method as claimed in claim 1, **characterized** in that filler frames are transmitted during DTX, from which the status of the radio channel is measured, and when transmitting the filler frames, the transceiver in DTX mode is prevented from sending a control signal.

7. A method as claimed in claim 1, **characterized** in that the coding and decoding is done with an AMR codec whose adaptation to the signal being coded or decoded is controlled with control signals.

8. A method as claimed in claim 1, **characterized** in that during DTX, SID frames and L2 filler frames are transmitted at the same power level as speech and data signals, and the status of the radio channel is measured from the SID frames and L2 filler frames.

9. A method as claimed in claim 1, **characterized** in that during DTX, a signal is transmitted, from which the status of the radio channel is measured, and status data of the radio channel is transmitted in a control signal on the basis of the measurement results obtained from the measuring.

10. A method as claimed in claim 1, **characterized** in that during DTX, signals are transmitted, from which the radio channel is measured, and between the signals used for measuring, a control signal is transmitted in a continuous manner.

11. A method as claimed in claim 1, **characterized** in that during DTX, signals are transmitted, from which the radio channel is measured, and between the signals used for measuring, a control signal is transmitted in a discontinuous manner.

12. A radio system comprising a base transceiver station (200) acting as a transceiver and at least two subscriber terminals (100, 101) acting as transceivers which are connected to each other by means of a signal propagating through the base transceiver station (200), which signal contains speech or data; a transceiver in the radio system comprises a coder (122), which codes the signal being transmitted to the radio path, and a decoder (114), which decodes the signal received by the transceiver, which has propagated in the radio path in the radio channel formed for the connection between the subscriber terminal and the base transceiver station, **characterized** in that the radio system comprises

measuring means (115) which measure the status of the radio channel formed between the base transceiver station and the subscriber terminal,

transmission means (124) which transmit a control signal on the basis of the measurement results of the measuring means (115) from the transceiver in DTX mode to the transceiver with which the transceiver in DTX mode has formed a radio channel, and which transmission means transmit the

control signal at a power level which is lower than the power level used for transmitting speech or data signals, and

control means (120) which update operating parameters with the received control signals from the transceiver which is connected to the transceiver in DTX mode by means of the radio channel.

13. A transceiver as claimed in claim 12, **characterized** in that the operating parameters are coding parameters of the coder (122) and decoder (114), and updating them alters the coding and decoding rate used.

14. A transceiver as claimed in claim 12, **characterized** in that the control means (120) update the coding parameters of the coder (122) and decoder (114) acting as a speech coder, and updating them alters the speech coding and decoding rate.

15. A transceiver as claimed in claim 12, **characterized** in that the control means (120) update the coding parameters of the coder (122) and decoder (114) acting as a channel coder, and updating them alters the channel coding and decoding rate.

16. A transceiver as claimed in claim 12, **characterized** in that the coder (122) and decoder (114) alter their adaptation rate on the basis of the updating of the control signals.

17. A transceiver as claimed in claim 12, **characterized** in that the measuring means (115) measure the radio channel from the filler frames transmitted during DTX, and the transmission means (124) interrupt the transmission of the control signal while the filler frames are being transmitted.

18. A transceiver as claimed in claim 12, **characterized** in that the coder (122) and decoder (114) have been implemented with an AMR codec, for instance, whose adaptation to the signal to be coded or decoded is accelerated by updating the operating parameters.

19. A transceiver as claimed in claim 12, **characterized** in that during DTX, the transmission means (124) transmit SID frames and L2 filler frames at the same power level as speech and data signals, and the measuring means measure the radio channel from the SID frames and L2 filler frames.

20. A transceiver as claimed in claim 12, **characterized** in that in DTX mode, the transmission means (124) transmit a control signal in a

continuous manner between the signals measured by the measuring means (115).

21. A transceiver as claimed in claim 12, **characterized** in that in DTX mode, the transmission means (124) transmit a control signal in a discontinuous manner between the signals measured by the measuring means (115).

22. A transceiver as claimed in claim 12, **characterized** in that the transceiver in DTX mode is a base transceiver station (200) which transmits a control signal to a transceiver which is a subscriber terminal.

23. A transceiver as claimed in claim 12, **characterized** in that the transceiver in DTX mode is a subscriber terminal which transmits a control signal to a transceiver which is a base transceiver station (200).

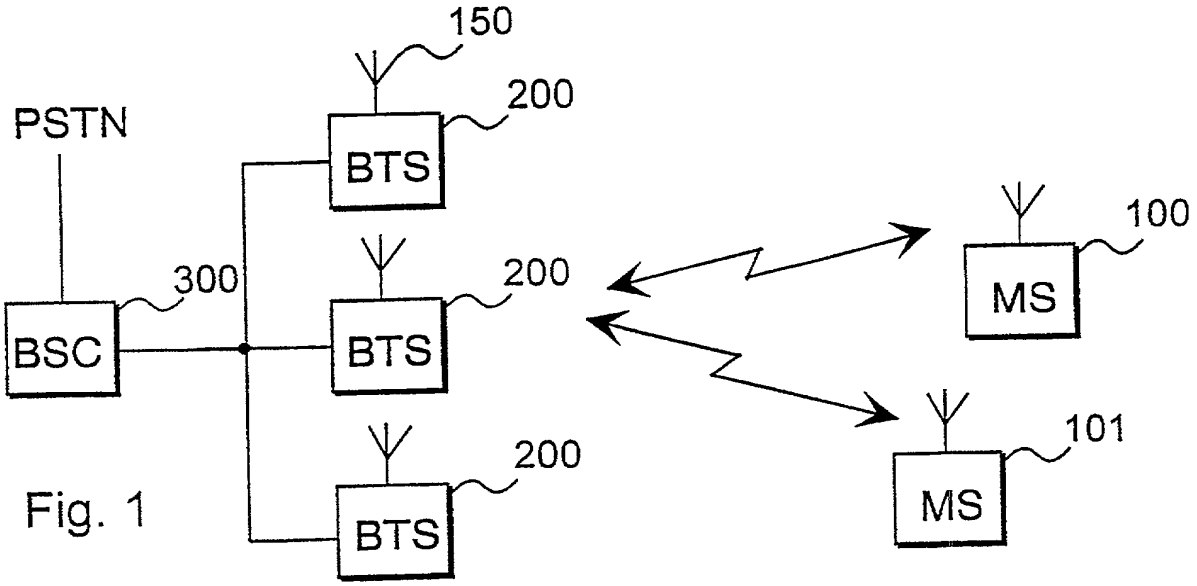


Fig. 1

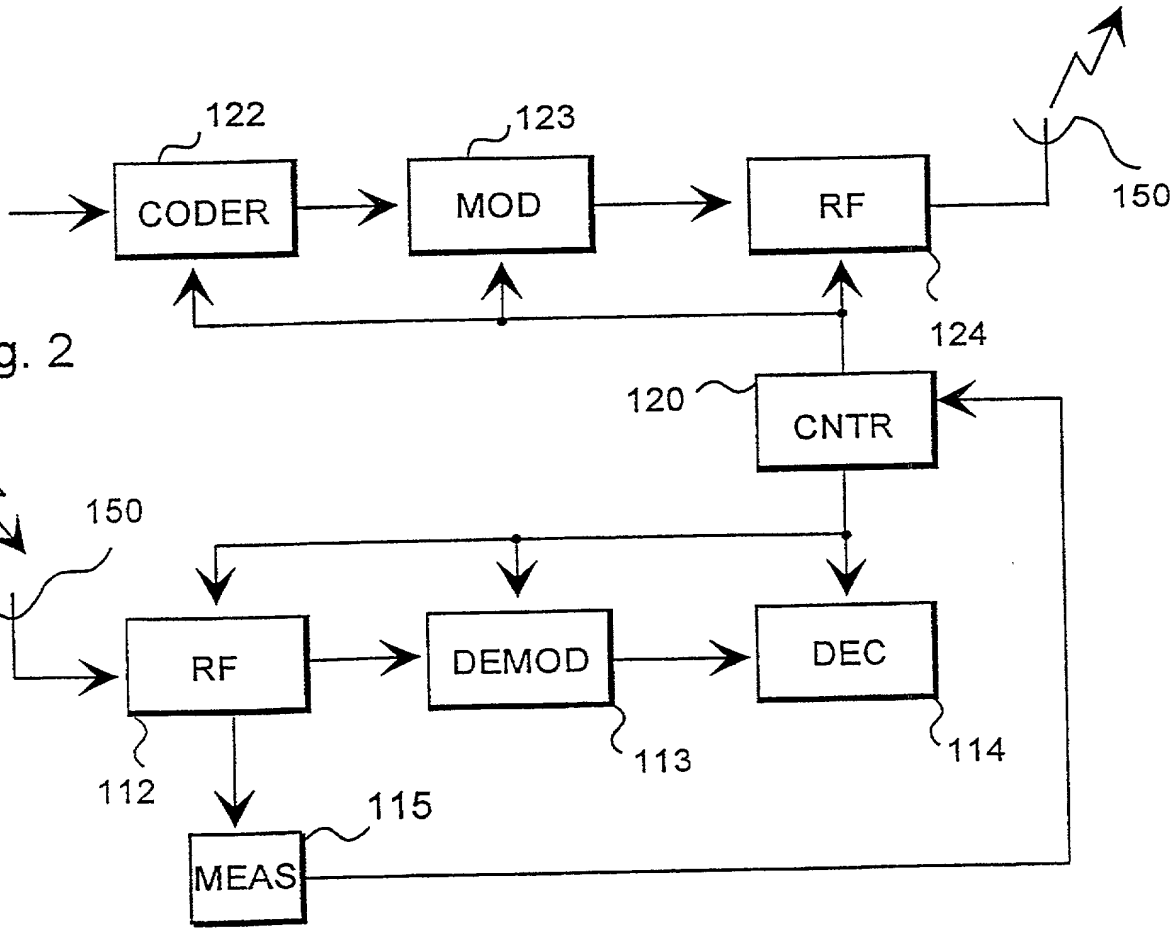
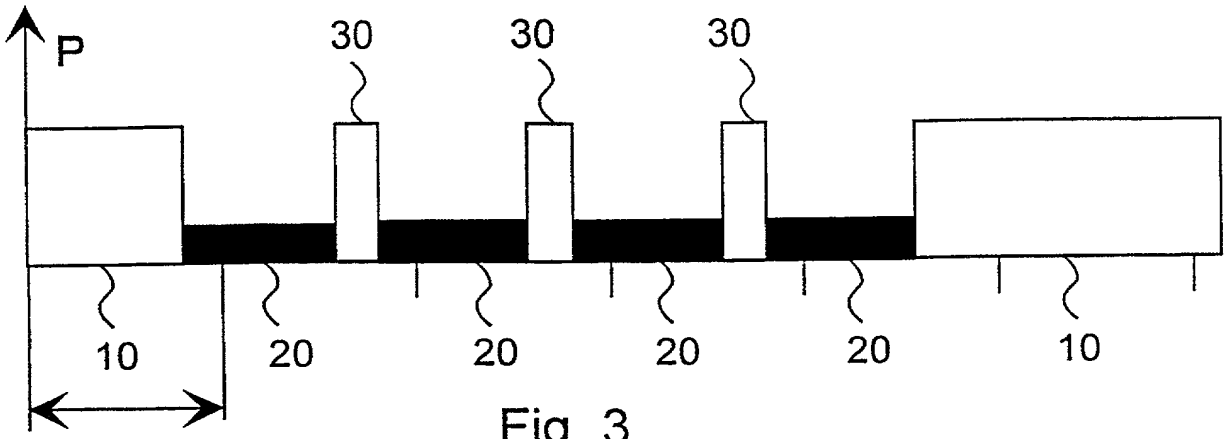


Fig. 2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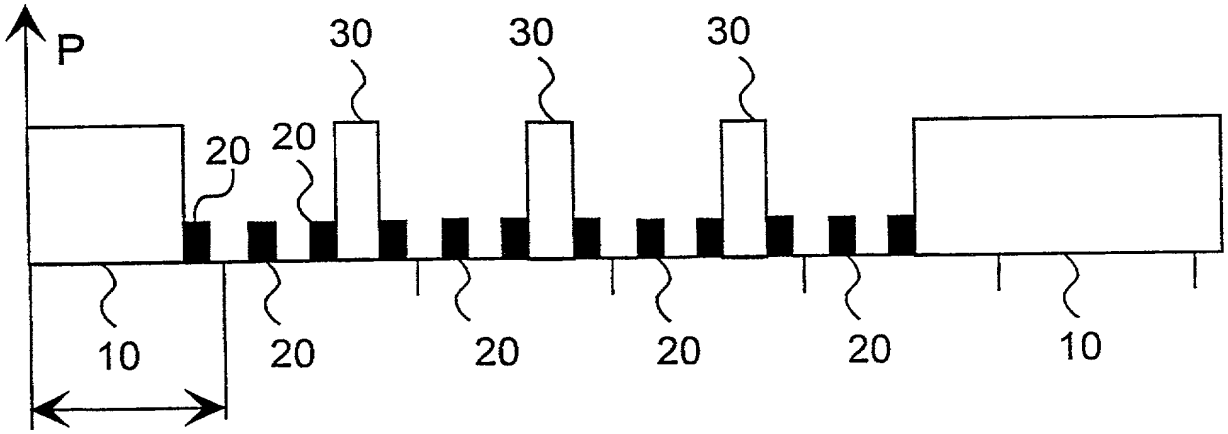
SACCH
multiframe
480 ms

Fig. 3


P
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SACCH
multiframe
480 ms

Fig. 4

T298059

FOR UTILITY/DESIGN
CIP/PCT NATIONAL/PLANT
ORIGINAL/SUBSTITUTE/SUPPLEMENTAL
DECLARATIONS

RULE 63 (37 C.F.R. 1.63)
DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

PM & S
FORM

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name, and I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the INVENTION ENTITLED

TRANSMISSION METHOD AND RADIO SYSTEM

the specification of which (CHECK applicable BOX(ES))

X BOX(ES)
→ A. ☐ is attached hereto.
→ B. ☐ was filed on _____ as U.S. Application No. _____ /
→ C. ☒ was filed as PCT International Application No. PCT/ FI99 / 00720 on 6 September 1999

and (if applicable to U.S. or PCT application) was amended on _____

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56. I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International Application which designated at least one other country than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate, or PCT International Application, filed by me or my assignee disclosing the subject matter claimed in this application and having a filing date (1) before that of the application on which priority is claimed, or (2) if no priority claimed, before the filing date of this application:

PRIOR FOREIGN APPLICATION(S) Number	Country	Day/MONTH/Year Filed	Date first Laid-open or Published	Date Patented or Granted	Priority Claimed Yes	No
981935	Finland	9 September 1998			X	

I hereby claim domestic priority benefit under 35 U.S.C. 119(e) or 120 and 365(c) of the indicated United States applications listed below and PCT international applications listed above or below and, if this is a continuation-in-part (CIP) application, insofar as the subject matter disclosed and claimed in this application is in addition to that disclosed in such prior applications, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56 which became available between the filing date of each such prior application and the national or PCT international filing date of this application:

PRIOR U.S. PROVISIONAL, NONPROVISIONAL AND/OR PCT APPLICATION(S) Application No. (series code/serial no.)	Day/MONTH/Year Filed	Status pending, abandoned, patented	Priority Claimed Yes	No

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

And I hereby appoint Pillsbury Madison & Sutro LLP, Intellectual Property Group, 1100 New York Avenue, N.W., Ninth Floor, East Tower, Washington, D.C. 20005-3918, telephone number (202) 861-3000 (to whom all communications are to be directed), and the below-named persons (of the same address) individually and collectively my attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith and with the resulting patent, and I hereby authorize them to delete names/numbers below of persons no longer with their firm and to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/ organization who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct the above Firm and/or a below attorney in writing to the contrary.

Paul N. Kokulis	~~16773~~	Dale S. Lazar	28872	Mark G. Paulson	30793	Michael R. Dzwonczyk	36787
Raymond F. Lippitt	17519	Paul E. White, Jr.	~~32011~~	Stephen C. Glazier	31361	W. Patrick Bengtsson	32456
G. Lloyd Knight	17698	Glenn J. Perry	~~28458~~	Paul F. McQuade	~~31542~~	Jack S. Barufka	~~37087~~
Carl G. Love	~~18781~~	Kendrew H. Colton	30368	Ruth N. Morduch	31044	Adam R. Hess	41835
Kevin E. Joyce	20508	G. Paul Edgell	~~24238~~	Richard H. Zaitlen	27248		
George M. Sirilla	~~18221~~	Lynn E. Eccleston	~~35861~~	Roger R. Wise	31204		
Donald J. Bird	25323	Timothy J. Klima	34852	Jay M. Finkelstein	21082		
Peter W. Gowdey	25872	David A. Jakopin	32995	Anita M. Kirkpatrick	32617		

(1) INVENTOR'S SIGNATURE: _____ Date: 2.1.2001

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	First	Middle Initial	Family Name
Residence			
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Post Office Address (include Zip Code)			

(FOR ADDITIONAL INVENTORS, check box ☐ to attach PAT 116-2 same information for each re signature, name, date, citizenship, residence and address.)